

Info Note

The potential for commercial hay production in Kenya

Survey reveals significant potential for commercial hay production, with economic benefits for growers and dairy farmers, improved milk yields and reduced GHG emission intensity

Suzanne van Dijk, Andreas Wilkes and Charles Odhong'

MAY 2018

Key messages

- Feed and fodder production, supply and feeding practices are among the most important constraints on the development of the Kenyan dairy industry. Increasing fodder supply, supported by advice provided to farmers on feed ration balancing has great potential to enable farmers to increase on-farm productivity, reduce the dip in milk production during the dry season, increase incomes and reduce GHG emission intensity.
- With a current large hay deficit in the country as well as financially viable business models, great potential exists for commercial hay value chains. A lack of machinery and storage facilities as well as knowledge of agronomic measures to increase hay yields and quality currently hinder hay growers to fully exploit market potential.
- Because commercial hay production is a recent development, financial institutions lack experience with and knowledge of the sub-sector. Technical assistance to both financial institutions and hay growers (for record keeping, financial management) could help overcome these barriers and support hay growers to make the required investments in machinery and storage facilities.

However inefficient resource use throughout the sector increases production costs, constrains profitability and competitiveness, and has major environmental implications, including high GHG emission intensity.

Feed and fodder production and supply, and on-farm feeding practices are among the most important constraints on the development of the Kenyan dairy industry. Insufficient and low quality feeding are the primary causes of low milk yields per cow. Low fodder availability in the dry season leads to a major dip in milk production every year. Many farmers resort to feeding purchased feed concentrates, which raises production costs, but with insufficient preserved fodder (e.g. hay, maize or grass silage), feed concentrate is often inefficiently used. The digestive system of a dairy cow enables the animal to digest fibrous feedstuffs, so feeding a dairy cow should start with fodder. Increasing fodder supply and improvements in feed ration balancing are important measures to increase on-farm productivity and reduce the dip in milk production during the dry season. These measures will also have benefits for farmers' incomes and reduction of the GHG emission intensity of dairy production.

Recognizing market potential, a growing number of farmers have begun to show interest in commercial hay production

Various fodders (e.g. Napier grass, Rhodes grass) are widely grown on smallholder farms in Kenya. However, average farm size is small and the quality of fodder grown is variable. According to surveys conducted by New KCC, a Kenyan dairy processor, their 54,000 long-term suppliers

Kenya's dairy sector contributes about 14% of agricultural GDP and 3.5% of total GDP. About 2 million farming households – or 35% of rural households – produce milk, and women play a major role in dairy production throughout the country. 70% of milk is produced on smallholder farms, and milk sales contribute significantly to farmers' incomes, including income for rural women. With population growth, urbanization and rising incomes, demand for dairy products is expected to grow rapidly.

currently have a hay deficit of approximately 20 million bales per year.¹

Recognizing this market potential, a growing number of farmers have begun to show interest in commercial hay production (Text Box 1).² More than 20 private farmers have invested in large-scale commercial hay production, and some have also developed businesses providing mechanized services on a contract basis to other farmers.

Text Box 1: Improved hay production by the Rift Valley Hay Growers Association

In 2015, more than 250 farmers came together to form the Rift Valley Hay Growers Association, with the objective of establishing a hay value chain as an investment opportunity for smallholder farmers in Kenya. The Association's main aim is to coordinate the standardization of hay production, storage, marketing and distribution in Kenya. The Association is promoting joint land lease, establishment of storage facilities, farmer training, contract farming and the establishment of a platform for hay growers and dairy farmers. It is also investigating how to support machinery and large scale storage facilities at strategic locations close to urban areas. With these storage facilities hay could be stored and sold when prices are higher, and value addition (chopping, mixing with other ingredients) could be done, contributing to a sustainable income for hay growers as well as generating employment.

An assessment, supported by CCAFS and conducted as part of the preparation of a low-emission, climate resilient dairy development project in Kenya,³ analysed the financial viability of commercial hay production, and identified commercial hay growers' investment and market facilitation needs. The assessment was carried out together with ten diverse commercial hay growers, all members of the Rift Valley Hay Growers Association.

Business models for commercial hay production

There are two common business models in commercial hay production: (1) production of hay using contract services for machinery (e.g. for planting, harvesting and baling), and (2) production of hay using own machinery plus contracting out mechanized services to other growers.

Many commercial hay producers use contract services for mechanized farm operations. Land preparation involves clearing the land of vegetation and stones. Machines are also used for ploughing and planting. Herbicides and fertilizers are applied on many farms to boost yields. Hay is harvested and baled twice a year.

Inputs include seeds (certified seeds or local seeds supplied by neighbouring farmers, or by own production), fertilizer (DAP, NPK, CAN or urea top dressing) and herbicides (glyphosate and broadleaf herbicides (e.g. Bactril, 2-4 D) (Table 1). Certified seeds are often unavailable, forcing farmers to use local seeds, which risks poor germination and lower yields per acre. Fertilizer and herbicides are supplied by local agro-vets and are mostly sufficiently available.

Table 1. Main investments, costs and revenues for hay growers using contracted services

| Costs per acre | Kenyan Shillings |
|---|------------------|
| Land lease | 7,000 |
| Land improvement investments (in year 0) | 9,000 |
| Certified seeds | 4,500 |
| Fertilizer and herbicide inputs | 8,600 |
| Contracted services incl. land preparation (in year 0) and planting (every 5 years) | 21,300 |
| Contracted services excl. land preparation and planting | 12,400 |
| Revenues per acre | Kenyan Shillings |
| Yields per acre (# of bales) | 220 |
| Average price per bale of hay | 150 |

Machinery is often owned by farmers who grow hay themselves and also contract out mechanized services to other growers. In addition to inputs for hay production, costs include fuel costs, machinery maintenance and skilled labour (Table 2).

Table 2. Main investments, costs and revenues for hay growers providing mechanized services

| Costs (for 1,500 acres incl. contracting services) | Kenyan Shillings |
|---|------------------|
| Machinery investments ⁴ | 20,312,000 |
| Office investments | 307,000 |
| Machinery maintenance costs | 1,690,000 |
| Fuel costs | 3,650,000 |
| Labour costs | 1,200,000 |
| Revenues per acre | Kenyan Shillings |
| Contracting services planting – harvesting and baling | 15,440/acre |
| Contracting services harvesting and baling incl. transport to storage | 12,000/acre |
| Seed harvesting (60 kg/acre) | 1,500/5 kg |

¹ New KCC, personal communication March 2016.

² See e.g. The Friesian (2015), BLGG Research (2013) and Performeter (2013)

³ Also referred to as Kenya's dairy Nationally Appropriate Mitigation Action (NAMA)

⁴ This includes new and second-hand machinery for all services incl. land preparation, seeding, spraying, harvesting, baling and transport

Assuming all mechanized activities on-farm are outsourced to contractors, the financial internal rate of return (FIRR) over 10 years for growers is 18%. For growers providing contracting services, the FIRR is 44%. Thus, although both business models are financially viable, hay production using contract services requires credit finance at lower interest rates than are currently available from most commercial sources.

Overcoming barriers to market growth

Currently the main barriers to further growth in commercial hay production include insufficient machinery and spare parts, which hinder timely land preparation, planting and harvesting of hay, and lack of hay storage facilities. Timely harvesting of hay is crucial to ensure high quality so as to enable dairy farmers to fully benefit from increased hay supply.

For machinery investments, affordable loans are required. Repayment schedules should fit the hay production cycle (harvesting twice a year) and hay growers should be enabled to use machinery as collateral. Many financial institutions lack experience with and knowledge of the hay sub-sector. Technical assistance to financial institutions as well as hay growers (for record keeping, financial management) could help overcome these barriers.

To establish a well-functioning commercial hay value chain, hay storage facilities are needed on farms and in strategic locations near major transport junctions (e.g. Nakuru). Many farmers without storage facilities are forced to sell their hay directly after harvest at a lower price. Other farmers use temporary, often poor quality storage facilities that are unable to maintain hay quality or sometimes lead to loss of hay bales due to mould.

Currently, direct linkages between hay growers and dairy producers do not exist, causing a hay deficit in many dairy producing regions and a hay surplus in the hay growing regions. The development of storage – marketing – logistics services to facilitate access of suppliers to the market will therefore be essential. An online platform, connecting hay growers and dairy farmers could provide a solution.

Finally, extension services to growers in best agronomic practices (e.g. for soil analysis, land preparation, planting, fertilizer and herbicide use as well as the right harvesting time) can substantially improve both yields per acre as well as the quality (digestibility) of hay. Many farmers could also benefit from business development services to improve financial management and the efficiency and economic performance of their operations.



Hay storage facilities enable farmers to safely store their hay as well as sell when market prices are high

Conclusions and way forward

Building a commercial hay value chain could provide significant economic benefits for both hay growers and dairy farmers. The assessment demonstrates that commercial hay production is financially viable. To build a strong commercial hay value chain, suitable credit products are needed to enable investments in machinery and storage facilities. Financial institutions could benefit from technical assistance in understanding the hay sub-sector and designing suitable products. Extension services to hay growers (e.g. in agronomy) and dairy farmers (e.g. in feed ration balancing) can substantially improve yields per acre, hay quality (digestibility) and dairy productivity.

Hay growers see great potential in the commercial hay value chain. Creating a “ready to feed” product by chopping hay – normally done by dairy farmers – and adding ingredients such as molasses could provide further value addition opportunities. The product could be easily stored in bags, provide extra income as well as create employment opportunities (e.g. for the youth) within the value chain.

Questions still exist on soil fertility management, the use and production of specific grass varieties (seeds) and fertilizer to ensure stable yields as well as high quality hay. Further research is needed to test and analyse the cost-effectiveness of specific varieties and fertilizer as well as identify the feasibility of a hay quality certification system.

References and further Reading

- BLGG Research (2013) Study on the Animal Feed and Fodder Sub-sectors. Quality Analysis of Animal Feedstuffs and Fodders in Kenya. Sub-report V.
- EADD (2011) Livestock Feed Production and Marketing in Central and North Rift Valley Regions of Kenya.
- Performer Solutions (2013) Study on the Animal Feed and Fodder Sub-sectors. Trends in the Kenyan Fodder Sub-sector. Sub-report VI.

This brief is based on a study conducted by UNIQUE forestry and land use GmbH as part of CCAFS support to the development of the Kenya dairy NAMA.

Suzanne van Dijk is a consultant in the Agriculture and Rural Development Division of UNIQUE forestry and land use GmbH

Andreas Wilkes (andreas.wilkes@unique-land-use.de) is an associated expert with UNIQUE forestry and land use GmbH.

Charles Odhong' is a consultant in the Agriculture and Rural Development Division of UNIQUE forestry and land use GmbH.

The views expressed in this brief are those of the authors and are not necessarily endorsed by UNIQUE forestry and land use, CCAFS or its supporters.

Research led by:



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



CCAFS and Info Notes

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic partnership of CGIAR and Future Earth, led by the International Center for Tropical Agriculture (CIAT). CCAFS brings together some of the world's best researchers in agricultural science, development research, climate science and Earth System science, to identify and address the most important interactions, synergies and tradeoffs between climate change, agriculture and food security.

CCAFS Info Notes are brief reports on interim research results. They are not necessarily peer reviewed. Please contact the author for additional information on their research.

www.ccafs.cgiar.org

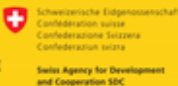
CCAFS is supported by:



Fund



Ministry of Foreign Affairs of the Netherlands



USAID
FROM THE AMERICAN PEOPLE

